## CLAIMS

The invention is claimed as follows:

1. A composition comprising zirconium phosphate granules synthesized using polyphosphate and zirconyl chloride under conditions wherein the pH of a mixture of polyphosphate and zinconyl chloride is at least 3.0 and the mixture is heated to greater than ambient conditions..

2. The composition of Claim 1 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

3. The composition of Claim 1 wherein the granules have a crystal structure.

4. The composition of Claim 1 wherein the granules have a phosphate to a zirconium molar ratio of approximately 1.8/1 to about 2.2/1.

5. The composition of Claim 1 wherein the granules have an ammonia sorption capacity of at least 0.8 mmol/g using an ammonia feed of approximately 7000 μ mo/l.

6. A composition comprising zirconium phosphate particles having a size distribution such that approximately 97% of particles have a size of greater than 4 μm; approximately 90% of particles have a size of greater than 10 μm; approximately 75% of particles have a size of greater than 20 μm; approximately 50% of particles have a size of greater than 25 μm; approximately 25% of particles have a size of greater than 30 μm; approximately 1% of particles have a size of greater than 70 μm.

7. The composition of Claim 6 wherein the zirconium phosphate is obtained through a synthesis using a polyphosphate.

8. The composition of Claim 7 wherein the synthesis includes zirconyl chloride.

9. The composition of Claim 7 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

10. The composition of Claim 6 wherein the granules have a phosphate to a zirconium molar ratio of approximately 1.8/1 to about 2.2/1.

11. The composition of Claim 6 wherein the granules have an ammonia sorption capacity of at least 0.8 mmol/g using an ammonia feed of approximately 7000 μmol/l.

12. A method of preparing zirconium phosphate particles comprising the steps of:

adding zirconyl chloride to a polyphosphate solution; and

heating a resultant solution or mixture above ambient temperature to obtain zirconium phosphate particles.

13. The method of Claim 12 wherein the resultant solution or mixture was reduced by heating the solution or mixture under reflux to a temperature of at least 100°C.

14. The method of Claim 12 wherein the zirconium phosphate particles are purified by a washing step.

15. The method of Claim 12 wherein the pH of the polyphosphate solution is between approximately 3.8 to about 5.7 before addition of zirconyl chloride.

16. The method of Claim 12 wherein the pH of the polyphosphate solution is between approximately 3.6 to about 5.5 before refluxing.

17. The method of Claim 12 including a molar ratio of polyphosphate/zirconyl chloride of approximately 1/1 to about 10/1.

18. The method of Claim 12 wherein the molar ratio of polyphosphate/zinconyl chloride is approximately 3/1 to about 5/1.

19. The method of Claim 12 wherein the polyphosphate concentration is approximately 0.1 M to 1.5M.

20. The method of Claim 12 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

21. A composition including zirconium phosphate particles obtained from sodium pyropolyphosphate having a particle distribution such that approximately 97% of particles have a size of greater than 15 μm; approximately 90% of particles have a size of greater than 20 μm; approximately 75% of particles have a size of greater than 25 μm; approximately 50% of particles have a size of greater than 30 μm; approximately 25% of particles have a size of greater than 35 μm; approximately 1% of particles have a size of greater than 70 μm.

22. A composition including zirconium particles obtained from sodium triphosphate particles having a particle distribution such that at least 97% of the particles have a size of greater than 4 μm; at least 90% of the particles have a size of greater than 13 μm; at least 75% of the particles have a size of greater than 20 μm; at least 50% of the particles have a size of greater than 25 μm; at least 25% of the particles have a size of greater than 35 μm; and at least 1% of the particles have a size of greater than 84 μm

23. A composition for removing ammonia from a fluid stream the composition comprising particles of zirconium phosphate synthesized using polyphosphate and zirconium salt wherein the composition has an ammonia absorption capacity of at least 0.8 mmol/g using an ammonia feed of approximately 7000 μ mol/l.

24. The composition of Claim 23 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

25. The composition of Claim 23 wherein the granules have a phosphate to zirconium molar ratio of approximately 1.8/1 to about 2.2/1.

26. A particle bed for removing a component from a fluid stream comprising zirconium phosphate particles having a size distribution such that 97% of particles have a size of greater than 4 μm; approximately 90% of particles have a size of greater than 13 μm; approximately 75% of particles have a size of greater than 20 μm; approximately 50% of particles have a size of greater than 27 μm; approximately 25% of particles have a size of greater than 35 μm; approximately 1% of particles have a size of greater than 70 μm.

27. The particle bed of Claim 26 wherein the zirconium phosphate is obtained through a synthesis using a polyphosphate.

28. The particle bed of Claim 26 wherein the synthesis includes zirconyl chloride.

29. The particle bed of Claim 26 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

30. The particle bed of Claim 26 wherein the granules have a phosphate to zirconium molar ratio of approximately 1.8/1 to about 2.2/1.

31. The particle bed of Claim 26 wherein the granules include zirconium sodium pyrophosphate.

32. A method of providing dialysis comprising the step of passing a dialysate fluid through a particle bed including a composition comprising granules of zirconium phosphate synthesized using polyphosphate and zirconium salt that was prepared by mixing the polyphosphate and zirconium salt at a pH of at least 3 and heating to a temperature of greater than ambient conditions at a molar ration of 1/10 to 10/1.

33. The method of Claim 32 wherein the polyphosphate is selected from the group consisting of sodium hexametaphosphate, sodium trimetaphosphate, sodium tripolyphosphate, and sodium pyrophosphate.

34. The method of Claim 32 wherein the zirconium salt is selected from the group consisting of zirconyl chloride, zirconyl nitrate, and zirconium sulfate.

35. The method of Claim 32 wherein the dialysis procedure is a continuous flow peritoneal dialysis procedure.